

POLICY, METHODS AND PROCEDURES
FOR THE DEVELOPMENT, IMPLEMENTATION AND MAINTENANCE
OF STANDARD DATA ELEMENTS AND CODES FOR USE
WITHIN THE NATIONAL COMMUNICATIONS SYSTEM

REFERENCES:

- (a) Mgr, NCS Memo for NCS Representatives, 8 Jul 1966:
"Standardization of Data Elements and Related
Features for NCS/DCS"
- (b) NCS Task 2-4: "NCS Std Data Elements & Codes",
NCS Long Range Plan FY 69-73
- (c) Bureau of the Budget Glossary of Automatic Data
Processing, December 1962
- (d) Exec Agent, NCS Memo for Mgr, NCS, 13 Oct 1965:
"Standardization of NCS Data Elements & Codes"
(forwarded to NCS Agencies by Mgr, NCS as encl
to ref (e))
- (e) Mgr, NCS Memo for NCS Representatives, 21 Dec
1965: "Standardization of NCS Data Elements
& Codes"
- (f) Mgr, NCS Memo for NCS Representatives, 18 Mar 1966:
"Inventory of Communications Data Systems &
their Data Elements & Related Features (RCS,
DD-DCA(OT)630-3)"
- (g) Mgr, NCS Memo for NCS Representatives, 21 Apr 1966,
Subj same as ref (f)
- (h) Bureau of the Budget (BOB) Circular A-86,
Standardization of Data Elements & Codes in Data
Systems, 30 Sept 1967

I. PURPOSE. This document supersedes the plan disseminated by reference (a) for accomplishing actions required under NCS Task 2-4 (reference (b)). Further, it provides policy and instructional guidance for the development, implementation and maintenance of Approved NCS Standard Data Elements and Codes in consonance with reference (h).

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II. GENERAL.

A. Objective of NCS Long Range Plan Task 2-4.

Identify and standardize data elements and their related features used in NCS Communications Data Systems with a view toward facilitating the interchange of information among the various NCS data systems and government agencies.

B. Description of Terms.

1. Data. Facts that refer to or describe an object, idea, condition, situation, or other factors (reference (c)).
2. Data System. An assembly of procedures, processes, methods, routines or techniques united by some form of regulated interaction to form an organized whole (reference (c)).
3. Data Element. A grouping of informational units which has a unique meaning based on a natural or assigned relationship and subcategories (data items) of distinct units or values. For example, month is a data element whose data items are "January", "February", "March", etc. (Reference (h)).
4. Data Item. A subcategory of distinct unit or value of a data element. (reference (h))
5. Data Code. A number, letter, symbol or any combination thereof used to represent a data element or a data item. (reference (h))

6. Related Features. The name, definition, abbreviation and identification of uses applicable to a data element; the name, explanation and abbreviation of a data item.

7. Kinds of Standards. The kinds of standard data elements and codes are identified as follows:

a. International Standards. A wide range of standards, including data elements and codes, having broad acceptance and the approval of the International Standards Organization, for voluntary use by a community of nations.

b. United States of America Standards. A wide range of standards, including data elements and codes, having broad acceptance and the approval of the United States of America Standards Institute (formerly the American Standards Association), for voluntary use by Government and industry on a national scale.

c. Federal Standards (data elements and codes). Standards, promulgated under the provisions of BOB Circular A-86, for use in the Executive Branch. In terms of application, there are two categories of Federal Standards.

(1) General Use. Federal general standards (such as for countries, States, counties, places, organizations, individuals and elements of time) for general use by most agencies in connection with an

extensive number and variety of related or unrelated data systems and programs.

(2) Program Use. Federal program standards for use in particular related programs concerning more than one agency. Examples are data elements and codes usually limited to use in weather, personnel, supply, and other similarly unique systems. In these cases, the same source data often are used by several agencies and aggregation and exchange of information on a program basis are the rule.

d. Agency Standards (data elements and codes). Standards limited for use within the programs of a particular agency and either not applicable to or not yet incorporated into a Federal standard.

(1) Standard data elements and codes which are limited to use within the NCS and are either not applicable to or not yet incorporated into a Federal standard are considered in this category and hereafter are called NCS Standard Data Elements.

(2) During the development of NCS standard data elements and codes, the following terms will apply:

(a) Potential NCS Standard Data

Element: A data element and its related features under consideration for standardization by the NCS Task 2-4 Working Group.

(b) Proposed NCS Standard Data Element:

A Potential NCS Standard Data Element that has

been developed and concurred in by the Task 2-4 Working Group.

(c) Recommended NCS Standard Data

Element: A Proposed NCS Standard Data Element that has the initial formal coordination of the NCS Operating Agencies and the approval of the Manager, NCS.

(d) Approved NCS Standard Data

Element: A Recommended NCS Standard Data Element that has the final formal coordination of the NCS Operating Agencies and the approval of the Executive Agent, NCS.

(e) NCS Implemented Federal Standard

Element: A Federal Standard Data Element that has been reviewed and found applicable to the NCS and has been placed in use within the NCS.

(f) NCS Standard Data Element: An Approved NCS Standard Data Element that has been placed in use within the NCS as an Agency standard.

C. Relationship Between NCS and Federal Standard Data Elements.

1. It is the intent that Approved NCS Standard Data Elements will be processed for promulgation as Federal Standard Data Elements in compliance with the policy outlined in paragraph 6 of BoB Circular A-86. A determination will be made on an individual case basis, with consideration given the factors involved in implementation that are discussed in paragraph V.B.

2. A given item of information codified and applied within the NCS may, however, differ from a Federal Standard Data Element in use in an ADP application external to the NCS. In cases of this type the NCS standard may be processed for promulgation as a Federal Standard based on its employment solely in information exchanges confined to and unique to the NCS.

3. The use of either NCS Standard Data Elements or NCS Implemented Federal Standard Data Elements will be mandatory in any information exchange affecting the NCS, e.g., exchange of data between NCS Agencies or between NCS Agencies and the Manager, NCS.

D. Relationship Between NCS Standard Data Elements and Standards of the NCS Operating Agencies.

1. Overall Relationship. Individual NCS Agencies may develop and apply Agency standards for intra-agency use only, but must conform to the policy stated in C. above and in reference (h) in inter-agency applications.

a. Ideally, standards of this type will be processed to become Federal or NCS Standards. However, if circumstances preclude this, the agency concerned will be obliged to convert such agency standards to either the Implemented Federal or NCS format, as appropriate, in each inter-agency exchange.

b. The extent to which Agency standards will be required will depend in large degree on the extent

to which Federal or NCS Standardization can be made to meet most needs. Economic factors and other considerations as outlined in paragraph 6 of reference (h), will be used when considering standards for adoption.

2. Relationship Between NCS and DoD Standardization.

a. The Director, DCA has been tasked by the Department of Defense (DoD) to effect standardization of data elements related to telecommunications employed within the Department. However, the Executive Agent, NCS, by reference (d) instructed that initial actions in the development of NCS and DoD standard data elements, as well as future actions will be accomplished by a single, integrated effort.

b. Any Agency standard developed by DoD will be subject to the requirements previously outlined for inter NCS Agency applications.

E. Future Documentation. The provisions of this document will be further refined and will be incorporated in a permanent NCS numbered directive at a later date. The directive will be developed by the Manager, NCS, in collaboration with the NCS Operating Agencies after experience has been gained in the course of conducting Task 2-4 and a representative number of NCS Standard Data Elements have come into being.

III. BACKGROUND.

A. Task 2-4 was inaugurated by a Manager, NCS

Memorandum of 21 December 1965 (reference (e)). Each of the NCS Major Operating Agencies subsequently designated a representative to participate in the task and working group action began.

B. Initial procedures and instructions relative to the task were developed through working group action and distributed to the NCS Representatives by Manager, NCS, memorandum of 18 March and 21 April 1966 (references (f) and (g)). An overall plan for the task was transmitted to the NCS representatives by a Manager, NCS, memorandum of 8 July 1966 (reference (a)).

IV. DEVELOPMENT METHODS AND PROCEDURES

Approved NCS Standard Data Elements will be developed through the sequential actions described below.

A. Identify Requirements. While requirements to date have been limited, either the Manager, NCS, or individual NCS Operating Agencies may nominate additional data elements for standardization. The nomination may be in terms of either a complete data system or individual data elements. The need for standardization indicated by nominations will be validated through working group action and formal coordination.

B. Identify Potential NCS Standard Data Elements. If the nomination is in terms of a data system, the working group will inventory the system and identify those individual elements considered appropriate for standardization. In other cases the group will examine individual

elements and confirm or deny the need for standardization expressed in the nomination. Each element agreed to as requiring standardization will be identified as a "Potential NCS Standard Data Element".

C. Initial Processing. Applying the general guidance and instructions presented at Attachment 1, and such additional procedures or instructions as have been or may be agreed to at the working group level, the working group will examine and process each Potential NCS Standard Data Element. In the course of this action each element will be named, described, coded and numbered. Others will be referred back to the nominating source or held for further consideration. Each element agreed upon for standardization and processed as above will be identified as a "Proposed NCS Standard Data Element".

D. Initial Coordination. Each Proposed NCS Standard Data Element will be transmitted as a Preliminary Draft for Information (PDI) to NCS liaison or working level representatives, when so designated, for initial coordination by the Assistant Manager, NCS Operations.

1. On a case-by-case basis agencies will be asked to supply such supplemental information as may be required in responding to each PDI.

2. An agency concurrence in a Proposed NCS Standard Data Element will not constitute an agreement to implement the standard.

E. Final Processing. The collective response of the agencies to each PDI will be examined by the working group and each proposed standard will be reprocessed to incorporate any appropriate expansion or modification and to formulate specific recommendations regarding Federal standardization. When this work has been completed, those Proposed NCS Standard Data Elements having the full concurrence of the Operating Agencies at the PDI stage and the ensuing full concurrence of the working group will be referred to the Manager, NCS, for action outlined below. Other proposed standards will be referred for further working group action or additional PDI coordination.

F. Manager, NCS Action and Final NCS Coordination.

1. Proposed NCS Standard Data Elements approved by the Manager will be forwarded to the Executive Agent, NCS and the NCS Operating Agencies as described in 2. below.

2. Each proposed standard approved by the Manager will be identified as a "Recommended NCS Standard Data

Element - Draft for Coordination (DFC)". The Manager will forward individual DFC's or groups of DFC's to the Executive Agent, NCS with appropriate recommendations, including recommendations regarding Federal standardization. In a concurrent transmittal the Manager will ask the principal designated representative to the NCS of each of the NCS Operating Agencies to submit final concurrence direct to the Executive Agent. Final concurrence in a Recommended NCS Standard Data Element will not constitute a commitment to implement that standard.

G. Action by the Executive Agent.

1. Each Recommended NCS Standard Data Element having the final concurrence of all Operating Agencies and the approval of the Executive Agent will be identified as an "Approved NCS Standard Data Element", and will be processed as described in 2., below. Others will be referred to the Manager, NCS or to the Operating Agencies for further action or other disposition as appropriate in each case.

2. The Executive Agent will:

- a. Notify the Manager of each standard approved as above.
- b. Forward to the Bureau of the Budget through SAPT, with appropriate recommendations, those Approved NCS Standard Data Elements recommended as Federal Standards.

V. IMPLEMENTATION POLICIES, METHODS AND PROCEDURES

A. Upon receipt of the above notification, the Manager, in collaboration with the Operating Agencies, will make a determination as to how the standard shall be implemented, with particular reference, in pertinent cases, as to whether or not implementation within the NCS should await completion of Federal standardization actions. Upon implementation each standard will be identified as an "Implemented NCS Standard Data Element" or "Implemented Federal Standard Data Elements" as appropriate.

B. Overall policies, methods and procedures relating to the above will be developed at a future date and promulgated by means of the documentation referred to in paragraph II.E. Some of the considerations which may influence implementation policies, methods and procedures and ensuing decisions are:

1. The extent of and need for data interchange as related to each element.
2. Advantages and disadvantages accruing to immediate or future implementation.
3. Technical, operational and economic considerations.
4. The inter-relationship of individual elements.
5. A time phasing plan with priority devoted to first, systems under development; second, systems undergoing modification, and; third, systems in operation.

VI. MAINTENANCE METHODS AND PROCEDURES. A consideration of detailed arrangements in this area will be deferred until the action discussed in paragraph V.B. is initiated. In general, a cataloging method will be decided upon and procedures will be developed for the periodic review and updating of the standard data elements that have been implemented. Full advantage will be taken of the responsibilities outlined in BoB Circular A-86 in this regard.

VII. COORDINATION POLICY. The terms of the policies, methods and procedures outlined in this document are based on the premise that unanimous agreement will be reached between the NCS Operating Agencies, the Manager, NCS and the Executive Agent, NCS in regard to the specific actions leading to the development of individual standard data elements. It is to be recognized, however, that unanimous agreement may not pertain in all cases and that a divergence in views may develop as to the disposition to be made of a particular Potential, Proposed, Recommended or Approved Standard Data Element. Efforts will be made to resolve any such differences at the lowest feasible level of the NCS management structure. If resolution is not possible at any given level the matter will be referred to the next higher level for appropriate action.

GUIDANCE FOR DEVELOPING
APPROVED NCS STANDARD DATA ELEMENTS

I. EXPLANATION AND CRITERIA: This information is provided to assist in identifying, establishing, and coding Data Elements and their related features.

A. Data Elements

1. Explanation

A Data Element is a specific item of information or a class of data. The members of the class are Data Items. Each Data Item has some unique feature which distinguishes it from other items; however, each Data Item also has characteristics, conditions or properties which determine the class, i.e., the Data Element, of which it is a member. For example, the Data Item "Major" is distinguished from "Colonel" by definition in terms of their relative position on a graduated scale established by law or regulation; however, these two Data Items have in common the property "Military personnel grade." Thus, "military personnel grade" could be considered the Data Element.

2. Standardization Criteria

- a. Each Data Element will be given a unique name.
- b. A Data Element may be given a unique mnemonic abbreviation.
- c. Each Data Element will be given a precise and succinct definition. It will have a meaning significantly different from any other Data Element. The definition will have only one acceptable interpretation. The definition will be thoroughly developed and tested to minimize ambiguity. The definition should first basically state "what the Data Element is" and then, if needed, further amplify to clarify understanding. Existing definitions in current publications should be used to the extent that they meet the above criteria.

Attachment 1

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- d. Each Data Element must have at least one Data Use Identifier, i.e., a Data Element must be used in at least one data system.
- e. Two or more Data Elements may be chained to each other in a prescribed sequence and used as a group. For example, "date" consisting of Data Elements "month," "day", and "year" might be such a chain. The chain is not a new Data Element and cannot be assigned a set of Data Items different from those Data Items of the Data Elements of which the chain is composed.
- f. Each Data Element should have a set of Data Items different from those of any other Data Element.

B. Data Items

1. Explanation

The Data Item is a subunit of descriptive information or value classified under a Data Element. It may be the datum which is placed in the provided spaces on a form or format, punched in a field in a punched card, or listed under a column heading on a machine listing or display device. Data Items are distinguishable from Data Elements since the Data Element is the class of data and the Data Item is the specific data. Data Items may be coded; (see paragraph C. below) or may be of such a nature that the literal meaning or value of the item is used without further coding. For example, Data Items of the Data Element "Military Personnel Grade" are such as Major and Technical Sergeant, and may be coded Ø4 and 36; whereas the Data Items for Data Elements such as "Personnel-Name" would literally be the name, i.e., Jones, John M.; Doe, Joe E.; and for the Data Element "Social Security Number" would be each actual (literal) social security number.

2. Standardization Criteria

- a. Each Data Item classified under a Data Element will have a unique name and meaning different from any other Data Item classified under that Data Element.

- b. A data item may be given an abbreviation unique within the Data Element.
- c. The Data Items classified under a Data Element must have homogeneous characteristics that fit within the Data Element grouping.
- d. A Data Item cannot be logically subdivided and retain significance of the Data Element class.

C. Data Codes

1. Explanation

To facilitate data systems integration and data interchange, Data Items which require coding will be assigned standard Data Codes (see paragraph B.1. above).

2. Standardization Criteria

- a. Data Codes should be developed to best accommodate all requirements, e.g., sorting, aggregating, grouping, manual use, system requirements.
- b. Except for literal Data Items, each Data Item will be assigned a number, letter, character, symbol or any combination thereof as a code within a single code structure for the whole Data Element.
- c. Suitable abbreviations may serve as a Data Code.
- d. The number of characters of a code should be predicated on the number of items within the element and should be as short as practicable; however, due consideration must be given to the likelihood of adding additional items sometime in the future. When this likelihood exists, the code should be designed to accommodate expansion without complete restructuring, redesign and recoding.

D. Data Use Identifiers

1. Explanation

When the Data Items of a Data Element appear in a system, they are used in specific contexts and

have specific connotations. These uses do not change the class, the Data Items, or the basic definition of the Data Element. These uses are called Data Use Identifiers. For example, consider the Data Element, "States of the United States". The system may require "State of Birth". In the system design, the terminology "State of Birth" could be used to name a file, and would be designated as a Standard Data Use Identifier. Subsequently, whenever it becomes necessary to use a data use term for "Birth State" or other designation with the same meaning, the standard Data Use Identifier "State of Birth" must be used. Other examples of Data Use Identifiers for the Data Element, "States of the United States" might be "State of Domicile," "State of Assignment," and "State from which entered on Active Duty."

2. Standardization Criteria

- a. Each Data Use Identifier will be different from any other Data Element or related feature.
- b. A Data Use Identifier may be given a unique mnemonic abbreviation.
- c. Data Use Identifiers use the Data Items of the Data Element from which they are derived.
- d. Two or more Data Use Identifiers can be chained to each other in a prescribed sequence and used as groups. For example, two Data Use Identifiers called "City of Birth" and "State of Birth" could be grouped together to form a chain called "Birth Place."

II. CHECKLIST FOR DEVELOPING RECOMMENDATIONS FOR STANDARD DATA ELEMENTS AND DATA CODES

A. CRITERIA: This information, some of it in the form of questions, should be applied uniformly to the informational elements that have been validated or justified.

1. Is the data element limited to a single generic class of data? If more than a single class of data is represented, in combination, then more than one element exists and should be established. For example, Federal Stock Number is composed of at least three distinct generic classes of data namely, "Federal Supply Group," "Federal Stock Class" and "Federal Item Identification."

2. Is the data element title or name unique? No two data elements, data items, data use identifiers or data chains should have the same title or name.

3. Has the data element been given a single, precise, unique and succinct definition? Each data element should have a meaning, in terms of "what it is," that is significantly different from the meaning of any other data element. The definitions should be susceptible of only one interpretation and there should be only one meaning given each data element. To the extent that existing definitions meet these criteria, they should be used or modified accordingly. Avoid defining the data element based on how it is used or what it does.

4. Be sure that all of the data items under each data element are homogeneous to that data element, based on common characteristics and how well they fit a particular data element definition. Make every attempt to include all the data items properly classifiable under each data element. Do not put nonhomogeneous data items under any data element. For example, under an "Inspection" data element, the data items "acceptance only required," "inspection and acceptance required," and "acceptance at destination" are not homogeneous data items. They may be homogeneous to a data element "acceptance."

5. Is each data item under a given data element mutually exclusive? There should be no overlap or duplication in the data items classified under any data element. It is well to remember that a data item by definition is "the smallest sub-unit or piece of information in a data system which cannot be further subdivided and retain any significant meaning."

6. Does each data element have a set of data items which is different from those of any other data element? The complete set of data items for any data element should be disjoint or unique to that data element. If two or more data elements contain the same data item, define the data item in each case, and it is likely that the apparent duplication will disappear. For example, the data item B-52, may appear under each of the data elements of "Aircraft," "Weapons System" and "Program Element." Each data item "B-52" should be defined to see if the definitions will be different, since under "Aircraft" you are speaking only of an individual item of equipment with all its component parts; under "Weapons System" you are speaking of the individual item of equipment plus the crew and certain closely allied support equipment and facilities; while under "Program Element," you are speaking of the aircraft, the crews, the closely allied supporting equipment and facilities, the money and all other direct or indirect items clearly chargeable to "B-52" as a program element.

7. Does the code assigned to each data item under a data element best accommodate all known requirements for use of the code (e.g., sorting, aggregating, grouping, and human understanding)? For example, if you have any of the first three requirements, then a mnemonic code should not be assigned.

8. Codes for all the data items under each data element should be assigned under a single code structure in as short a configuration as possible to cover the universe of data items under each data element. Keep in mind that the only universe to be concerned with is the universe of data items as related to given data elements. Each code structure should be designed to accommodate maximum forecasted expansion of the range of data items without the need for restructuring, redesign, gimmicking or recoding. For example, do not establish a single character (A/N) code structure if the universe of data items under any data element, plus forecasted expansion, is likely to exceed 34 characters, eliminating the "1's" and "0's". Since we are coding the smallest meaningful pieces or subunits of data, it is imperative that the codes be as short as possible and that, within a given data element, only one code be assigned to each data item. In the standardization phase, do not allow preexisting constrictions (e.g. 80 column card) to govern or be the primary consideration. The most important considerations are identification and definition of the data elements, assignment of their values (data items) and proper coding of those data items. Constrictions are an important and perhaps governing consideration in the implementation phase of standard data elements and codes on a system by system basis.

9. Is it necessary to refer to or use any data element and its data items and codes more than once within a data system? If it is, then Data Use Identifiers should be establish-

ed, so that the data element can be readily recognized by its authorized alternate name(s). Keep in mind that, in assigning data use identifiers, be sure that they have unique names, their use is explained, if necessary, and that they always are reported or recorded in terms of the same data items and codes as the data element itself. For example, assume that "Julian Calendar Date" is a data element. It has the data items of "Julian Data Year" and "Julian Year Day." The data codes are two digit (numeric) for the year, running from 00 to 99 (a century) and three digit (numeric) for the day, running from 001 to 365, or 366, respectively. Suppose further, that it is necessary to refer to "shipping date," "date received," "contract date," "effective date" etc., and that these are all Julian Calendar dates. Each of these would be established as Data Use Identifiers under the data element, "Julian Calendar Date." Each data use identifier would always use and be reported in terms of the codes 00 - 99, for year, and 001 - 365, for day. Identical data use identifiers should not be used for two or more data elements, but should be modified to identify each data element under which they appear. For example, if a data element of "date" (composed of the data items of month, day and year) were also used in the same data system as the "Julian Calendar Date," mentioned above, then the same data use identifiers could not be used under both data elements without modifying one set by adding "Julian Calendar" to each data use identifier, in order to identify the data element under which they appear.

10. Are data elements, data items, or data use identifiers used in combination within the system? If so, then data chains should be formed. In all cases, the data items and/or codes for the chain should be identical with those prescribed for the standard data elements, data items or data use identifiers making up the data chain. The name of the "Data Chain" should be unique. For example, "Federal Stock Number" is a data chain composed of the possible data elements "Federal Stock Group," "Federal Stock Class" and "Federal Item Identification." When used in a data system, a data chain should always appear in the same prescribed sequence.

11. In general, the codes in existence today within data systems have significance built into them. In identifying, developing, and coding standard data elements, it is necessary to determine each such bit of significance in a code and make a decision as to whether or not to establish each bit as a separate data element. The following questions should be asked (summary of the aforementioned criteria).

a. Does each bit of significance actually mean something substantially different from other bits of significance?

b. Is the set of data items for each bit of significance different from the set of data items for any other bit of significance?

c. Can you meet known requirements of all functional areas only by separating the bits of significance?

If the answer to all three questions is "yes," separate data elements must be established for each bit of significance. If two of the three questions are answered "no," then separate data elements need not necessarily be established. If two of the three questions are answered with "yes," (especially the last two), then a separate data element should be established for each bit of significance. If the answer to all three questions is "no," then separate data elements will not be established for each bit of significance.